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ABSTRACT

An excimer laser apparatus using a bandwidth-narrowing optical system including a beam diameter-enlarging optical system and a Littrow mounting reflection type diffraction grating is made suitable for use as a laser light source for semiconductor lithography or the like by surmounting the limit to bandwidth narrowing due to wavefront distortion induced by the reflection type diffraction grating. In an excimer laser apparatus having a bandwidth-narrowing optical system including a Littrow mounting reflection type diffraction grating and a combination of a beam diameter-enlarging optical system and a slit placed on the entrance side of the reflection type diffraction grating, diffracted wavefront distortion (a measured value for He-Ne laser light) within the laser irradiation area of the reflection type diffraction grating in Littrow mounting is not more than $\lambda/10$, where λ is a measuring wavelength.